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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/050,866

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Kiyoshi Yoshizumi

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EXAMINER

HODGE, ROBERT W

ART UNIT

PAPER NUMBER

1795

NOTIFICATION DATE

DELIVERY MODE

07/14/2010

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/050,866	Applicant(s) YOSHIZUMI ET AL.	
	Examiner ROBERT HODGE	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 April 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4, 8-18, 20, 32-39, 46-49, 51-57, 59-62, 65 and 66 is/are pending in the application.
- 4a) Of the above claim(s) 2-4, 9-12, 16-18, 20, 32-36 and 46-49 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 8, 13-15, 37-39, 51-57, 59-62, 65 and 66 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>7/2/10</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

Applicant's arguments, see Remarks/Arguments, filed 4/28/10, with respect to the indefiniteness of claim 61 regarding a "predetermined valve" are persuasive since the amendment filed 4/28/10 changes it to a "predetermined value".

The remainder of Applicant's arguments filed 4/28/10 have been fully considered but they are not persuasive. With regards to the new matter rejection applicants still have not provided any proof that applicants had possession of the claimed invention at the time of the invention such that the system will absolutely never allow hydrogen-off gas to pass through the fuel cell ever again. Figures 1, 6 and 7 clearly contradict applicants position because it is clear in all of said figures that the hydrogen-off gas passes through a valve 104 and there are passages positioned to recycled the hydrogen-off gas after passing through the valve 104 to the hydrogen feed line which feeds the fuel cell. So by said recycling the hydrogen-off gas does in fact pass through the fuel cell again and applicants did not have possession of the negative limitations of the claimed invention at the time of the invention. The passages from the specification that applicants provide in their remarks are paraphrased and the scenario is not commensurate with the scope of the claims and it appears that applicants are asking the Examiner to read limitations from the specification into the claims which the Examiner cannot do. With regards to the omitting of essential elements, applicants have continuously argued functional limitations throughout the entire prosecution history of this application and in order for a function to occur sufficient structure must be

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recited. As was stated the grounds of rejection, the essential element that is necessary is "a device that is controlled by the control portion to control the feeding of the oxygen-off gas". Without any structure present in the oxygen-off gas conduit the oxygen-off gas will just flow through the conduit uninhibited and there is not sufficient structure present in claim 1 to allow or inhibit the flow of the oxygen-off gas. Applicants arguments with regards to the prior art rejections are directed again towards functional limitations and the material worked upon. The instant claims are apparatus claims not method claims and as has been stated before MPEP 2114 states "APPARATUS CLAIMS MUST BE STRUCTUR-ALLY DISTINGUISHABLE FROM THE PRIOR ART" and "MANNER OF OPERATING THE DEVICE DOES NOT DIFFERENTIATE APPARATUS CLAIM FROM THE PRIOR ART". Furthermore applicants are arguing the limitations of the material worked upon by the apparatus such as hydrogen, hydrogen-off gas, oxygen, oxygen-off gas and a mixture of hydrogen-off gas and oxygen-off gas. Applicants are directed to MPEP 2115 which states "MATERIAL OR ARTICLE WORKED UPON DOES NOT LIMIT APPARATUS CLAIMS". Therefore as long as all of the same structure as recited in the instant claims is present in the prior art, the prior art is capable of the functional limitations and the manipulations of the material worked upon. It is therefore submitted that all of the prior art in the grounds of rejections below is in fact capable of the functional limitations and the manipulations of the material worked upon since it contains all of the structure as required by the instant claims. Furthermore in an effort to advance prosecution not only has the Examiner provided prior art references that contain all of the structure, the Examiner has also shown that the prior art is in fact

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operating and manipulating the materials worked upon the same as recited in the instant claims. Although applicants provide a controller in their claims the functional limitations are not given patentable weight as clarified above since there is no recitation that the controller is in fact “programmed to” perform those functions. It is suggested if applicants wish for weight to be given to their functional limitations that the claims be amended to recite a “control portion programmed to”. Even still as also clarified above the prior art is still operating and manipulating the same as is recited in the instant claims. With regards to claims 51 and 53 and the means for opening the valve, it is quite clear that Vartanian has a controller 6A that controls a control valve 7 in response to a measured value compared to a reference value from the pressure difference sensor 6. Given that the system uses gases the ideal gas law $PV=nRT$ applies. Therefore when the hydrogen is at a higher pressure the volume will decrease thus increasing the hydrogen concentration per volume and vice versa when the pressure is lower the volume increases thus decreasing the hydrogen concentration per volume. Therefore Vartanian meets the claim limitations as recited. Therefore the rejections will be maintained.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

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Claims 8 and 51-53 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claims 8, 52 and 53 recite the negative limitation that the hydrogen-off gas which passes through the valve exits the onboard fuel cell system **without further passing through the fuel cell**, Claim 51 recites the negative limitation stating "wherein the hydrogen off-gas which flows through the valve when the valve is opened **does not circulate back to the fuel cell**". No support can be found anywhere in the instant specification to support the above negative limitations and therefore the amendments are New Matter.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1, 13-15, 37-39, 54-57, 59-62, 65 and 66 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential elements, such omission amounting to a gap between the elements. See MPEP § 2172.01. The omitted elements are: a device that is controlled by the control portion to control the feeding of the oxygen-off gas.

Claim Rejections - 35 USC § 102

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

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Claims 1, 8, 13, 14, 37-39, 52-54, 56, 59, 60, 62 and 65 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,059,494 hereinafter Vartanian.

As seen in the figures Vartanian teaches a fuel cell system comprising: a fuel cell 1 which is supplied with fuel and air, which generates electric power using the fuel and the air, and which discharges anode exhaust and cathode exhaust that have been consumed; a first flow passage which leads to an anode exhaust port of the fuel cell and through which the discharged anode exhaust flows; a second flow passage which leads to a cathode exhaust port of the fuel cell and through which the discharged cathode exhaust flows; a mixing portion 15 which introduces the discharged anode exhaust and the discharged cathode exhaust from the first and second flow passages respectively and which mixes the cathode exhaust with the anode exhaust; a third flow passage (inherently present) which leads to the mixing portion and through which the mixed gases flow so that the anode exhaust is discharged to the atmosphere: a valve 7, 24 or 26 which is disposed in the first flow passage; a control portion 6A which controls the valve to open and close the valve to allow or block flow of anode exhaust to the mixing portion and thereby controlling flow and concentration of anode exhaust which is mixed with cathode exhaust in the mixing portion; a flow rate-reducing portion 20 including a buffer which is disposed in the first flow passage between the valve and the mixing portion, which reduces the flow rate of the anode exhaust flowing from the valve, and which delivers the hydrogen-off gas to the mixing portion, said flow rate-reducing portion has an inlet port and an outlet port, wherein the diameter of the outlet port is smaller than that of the inlet port, said flow-rate reducing portion has a volume per unit length

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greater than that of the inlet or the outlet port, said flow-rate reducing portion has a variable volume (whole document). Furthermore Vartanian teaches that the controller 6A controls the valve 11, which regulates the flow of the oxygen flow for the whole system including the oxygen-off gas into the mixing portion 15 and also that the exhaust from the mixing portion contains little to no hydrogen thereby avoiding ignition after exhaustion. With regards to the negative limitations stating that the hydrogen does not pass through the fuel cell after passing through the valve, it is quite clear in figure 3 that after the hydrogen off-gas flows through valve 7 it does not flow through the fuel cell since all of it flows into the mixing portion 15.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1, 8, 13-15, 51-54, 56, 59, 60, 61, 62 and 65 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 00/63993 hereinafter Joerissen et al. in view of U.S. Patent No. 6,696,188 hereinafter Boneberg et al.

Through the provided translation of WO 00/63993 Joerissen et al. teaches a fuel cell unit 7 that utilizes a metal hydride hydrogen storage device 19 to provide hydrogen to the anode chamber 2 by means of a passage provided with a pressure reduction valve 24. The anode chamber outlet of the fuel cell provides a passage for unreacted hydrogen to be recycled to the anode chamber inlet by means of a pump 9 or exhausted to the atmosphere via a further passage with a valve 7, each of the exhaust

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passages for discharging anode and cathode off-gas are provided with condensed water separators 8a and 8b, wherein water separator 8a (i.e. flow-rate reducing portion) inherently reduces the flow rate of the exiting anode exhaust and also includes an inherent buffer (i.e. storage of water and an area where the water is separated from the gas). Joerissen et al. also teaches a Programmable Logic Controller 14 that controls the valves and pumps of the system based on input received from the entire system such as cell voltage and temperature which then controls all of the fluid flow streams based on said input by either operating pumps and/or valves that are opened and closed at regular intervals and also according to other factors such as concentration which can be determined indirectly from at least cell voltage. Joerissen et al. further teaches a pump 11 (i.e. pressure changing device) in the oxidant inlet stream for the fuel cell to provide oxidant to the fuel cell (see the whole translation of Joerissen, now provided). The Examiner notes that applicants have elected the species of figure 6 and there is only support for a pressure changing device in the seventh flow passage, which is known as the oxidant inlet stream, there is no support in figure 6 for a pressure changing device in the second flow passage, which is known as the oxygen-off gas stream and therefore the limitation of "a flow rate-changing device which is disposed in the second flow passage" has been withdrawn from consideration from claims 11 and 12.

Further clarifying Joerissen for claims 8 and 51, Joerissen teaches in figure 1 that the hydrogen off gas from the fuel cell may circulate back to the fuel cell (i.e. a recycle

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loop is provided from the hydrogen exhaust passage to the hydrogen inlet passage of the fuel cell).

It is also noted that in figure 1 of Joerissen, after the hydrogen off-gas leaves valve 7 it does not get fed back to the fuel cell.

Joerissen does not teach a mixing portion that mixes the anode and cathode exhaust gases.

Boneberg et al. teaches a fuel cell system being supplied with hydrogen and oxygen gases, which in turn generates electric power (column 3, lines 10-15) then mixing the exhaust gas streams from a fuel cell (figure 1 and column 5, lines 1-3) and combusting the mixture catalytically (column 2, line 15 and column 4, line 2) and then venting the combustion product to the atmosphere thus having a reduced hydrogen content (figure 1 and column 5, line 3).

At the time of the invention it would have been obvious to one having ordinary skill in the art to include a mixing portion at the anode and cathode exhaust ports of Joerissen as taught by Boneberg in order to provide a spent gas mixture that could be catalytically combusted to fully utilize the reactant gases for heating the system as needed and therefore not wasting any reactant gases by venting them to the atmosphere. It is submitted that a skilled artisan would understand how to program the PLC of Joerissen and would therefore understand that by the combination of the Joerissen and Boneberg references above the valve that is controlled by the PLC is capable of controlling the valve to allow or block flow of the hydrogen-off gas to the mixing portion of Joerissen as modified by Boneberg.

By said combination the exhaust leaving the system will contain little or no hydrogen thereby avoiding ignition after exhaustion.

Regarding claims 52 and 53 Boneberg teaches that during normal operation of the fuel cell only the exhaust gases from the anode and cathode exhaust streams of the fuel cell are fed to the mixing portion (column 3, lines 32-45).

Claims 37-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Joerissen et al. in view of Boneberg et al. as applied to claim 14 above, and further in view of U.S. Patent No. 2,850,038 hereinafter Shabaker.

Joerissen et al. as modified by Boneberg et al. does not teach any properties of the flow-rate reducing portion.

Shabaker teaches a flow control device for gaseous material employing variable diameter orifices that can in particular be smaller or larger depending on the control conditions (column 1, lines 15-21 and column 4, lines 3-60).

Joerissen et al. as modified by Boneberg et al. and Shabaker are analogous art because they are from similar problem solving area of controlling the flow of gases.

At the time of the invention it would have been obvious to one having ordinary skill in the art to include different diameter orifices as well as changing the volume of the flow rate reducing device (i.e. water separator) of Joerissen et al. as taught by Shabaker in order to properly remove all of the water from the anode exhaust so that it can be reused for humidification and cooling thereby optimally operating the system, because for example if the flow is too fast not enough water will be removed for reuse in the

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system and if the flow is too slow the system would get backed up and potentially flood the anode chamber thus rendering the fuel cell useless.

Claims 15, 51 and 66 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vartanian in view of U.S. Patent No. 6,455,181 hereinafter Hallum.

Vartanian as discussed above is incorporated herein.

Vartanian does not teach the use of a hydrogen concentration sensor in the anode exhaust line.

Hallum teaches a fuel cell system with a sensor 80 that detects the concentration of hydrogen in the anode outlet lines (column 5, line 18 - column 7, line 57).

At the time of the invention it would have been obvious to one having ordinary skill in the art to provide a hydrogen concentration sensor in the anode exhaust line of Vartanian as taught by Hallum in order to provide a fuel cell system that can regulate the anode gases based on the hydrogen concentration measured by the sensor thereby improving the overall operation of the fuel cell. If a technique has been used to improve one device (providing a hydrogen concentration sensor in the anode exhaust line), and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way (providing a fuel cell system that can regulate the anode gases based on the hydrogen concentration measured by the sensor thereby improving the overall operation of the fuel cell), using the technique is obvious unless its actual application is beyond his or her skill. See MPEP 2141 (III) Rationale C, KSR v. Teleflex (Supreme Court 2007). It is submitted that a skilled artisan would understand how to program the controller of Vartanian and would therefore understand that by the combination of the

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Vartanian and Hallum references above the valve that is controlled by the controller is capable of controlling the valve to allow or block flow of the anode exhaust to the mixing portion based on the hydrogen concentration.

Claims 55 and 57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vartanian as applied to claims 1 and 56 above, and further in view of U.S. Pre-Grant Publication No. 2003/0091879 hereinafter Rusta-Sellehy.

Vartanian does not teach the use of a timer or that a predetermined time is one second or less.

Rusta-Sellehy teaches a fuel cell system wherein the hydrogen exhaust valve is controlled by a controller with the use of a timer and the interval of opening the valve may be varied in various operating conditions and optimized by experiments (figure 2 and paragraph [0052]).

At the time of the invention it would have been obvious to one having ordinary skill in the art at the time the invention was made to use a timer to control the exhaust valve of Vartanian as taught by Rusta-Sellehy in order to provide a fuel cell system that will not flood with water generated in the fuel cell reaction. If a technique has been used to improve one device (using a timer to control the exhaust valve), and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way (providing a fuel cell system that will not flood with water generated in the fuel cell reaction), using the technique is obvious unless its actual application is beyond his or her skill. See MPEP 2141 (III) Rationale C, KSR v. Teleflex (Supreme Court 2007). It further would have been obvious to one having ordinary skill at the time of the invention

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to optimize the time used for opening the valve by experiments as taught by Rusta-Sellehy since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art, in the absence of unexpected results. See MPEP 2144.05.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ROBERT HODGE whose telephone number is (571)272-2097. The examiner can normally be reached on 8:00am - 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Basia Ridley can be reached on (571) 272-1453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Robert Hodge/
Primary Examiner, Art Unit 1795